Traffic Management Near U-turn to Avoid Accidents

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Abstract— **Road Traffic is one of the most vital problems in the hastily developing world. Study of different aspects and issues related to the road traffic problems are presented using prominent technology – the Internet of Everything (IoE) for developing a smart system to monitor various parameters related to the problem and using it as an effective solution. The idea is to manage traffic near U-turns so that accidents can be prevented. By receiving signals from sensors, the device can predict vehicle movement. Sensors and traffic signals are placed on the lane near U-turns along with laser. Signal is always green, if any vehicle approach near the sensor the light is turned to red in the opposite lane along with laser and it is restored to green after vehicles takes U-turn.**

Keywords- Arduino Uno Board, GSM Module

I. INTRODUCTION

The constantly growing transport sector has resulted in an increase of the accidents every day. The accident mainly occurs due to our carelessness and breaking of traffic rules. Indirect left-turn treatments have been increasingly used as design alternatives to address problems that are associated with left-turn egress maneuvers from side streets or driveways at two-way stop-controlled intersections [1]. In this project, the proposed system aims to avoid collisions between vehicles mainly occurring in U-turn bends, hair-pin bends, short corners, blind curves, etc., by alerting the vehicle drivers about the accidents that might occur. If case of any vehicle breakdown or repair of the vehicle, the interrupt signal will be sent to the control room thereby the problems can be solved. The accidents due to the negligence of the driver are prevented by warning him through the buzzer and light indication. Similarly, if the driver makes an illegal traffic jump, the laser detects it and sends the signal to the controller and shows the message about the spot where the jump has occurred. This system makes use of infrared sensor and other embedded systems.

An accident avoidance system is an automobile safety system designed to reduce the severity of an accident. Many studies about the operational and safety effects of U-turns at signalized and non-signalized intersections have been conducted. Past results from researches have no evidence to prove that U-turns at signalized intersections present major safety or operational problem. On detecting the vehicle approaching from the other side the system provides a warning to the driver to avoid the mishap. By allocating the right of way to different sets of mutually compatible traffic movements during distinct time intervals the traffic signals have been effectively used to manage conflicting requirements for the use of road space. Considerable work has been done to develop various approaches in order to boost traffic efficiency, which can be categorized as fixed-time, traffic responsive and predictive control ones. However, few researches have been found to deal with heavy vehicle U-turns. This system focuses on providing an alternative design for accommodating a safe U-turn at a signalized intersection.

II. RELATED WORK

Eye blink detection, the use of template matching is necessary for desired accuracy in analyzing the user's blinking since it allows the user some freedom to move around slightly [2]. Though the main purpose of such a system is to serve people with paralysis, it is a desirable three feature to allow for some slight movement by the user or the camera that would not be feasible if motion analysis were used alone. The normalized correlation coefficient is used to achieve the tracking [2]. The detection of eye blinking and the analysis of duration of eye blink are based exclusively on

observation of the correlation scores generated by the tracking at the previous step using the online template of the user's eye. As the user's eye closes during the process of a blink, its similarity to the open eye template decrease. Likewise, it re-claims its similarity to the template as the blink ends and the user's eye becomes fully open again. This decreasing and increasing similarity directly correspond to the correlation scores returned by the template matching procedure the system proposed in this paper provides a binary switch input alternative for people with disabilities similar to the one presented by Grauman et al., [2]. However, some significant improvements and contributions were made over such predecessor systems.

IR sensors, aside from horizontal offset and orientation of the camera, another issue of concern is the vertical offset of the camera in relation to the user's eyes. The experiments showed that placing the camera below the user's head resulted in desirable functioning of the system. But, if the camera is placed too high above the user's head, then it is aiming down at the user at a significant angle and the eye blink detection is no longer as accurate. Which results in a very small amount of variation in correlation scores as the user blinks, since nearly all that is visible to the camera is the eyelid of the user and its difficult to detect the eye blink. Therefore, when positioning the camera, it is positive to the detection accuracy to maximize the degree of variation between the open and closed eye images of the user. Finally, with respect to the clinical environment, this system provides an unobtrusive alternative to the one tested by Miglietta et al., in which the user should wear a set of eyeglasses for blink detection.

Traditional traffic-safety literature has been comparatively focused on crash frequency estimation and hence belongs to the earlier category. However, the approach is not sufficient to "predict" crashes in real time using traffic-flow variables measured from loop detectors in an advanced traffic management system (ATMS) environment. There is a necessity to evaluate the models that use dynamic flow variables as inputs and determine whether or not they would lead to a crash occurrence. This approach belongs to the next category (i.e., the disagree-gate studies), which are relatively new and are made possible by the exploration of data collection and analysis capabilities in the arena of intelligent transportation systems (ITS).

The important principle of this approach involves classifying patterns in the traffic-surveillance data detected prior to past crashes. The traffic-surveillance systems may then be improved to detect the identified patterns in instantaneous data. A reliable identification of such patterns could surface the way for developing practical strategies to avoid crashes, such as, warning to the motorists about variable speed limits. However, in this paper, the scope has been limited to show the potential of statistical models for reliable identification of these crash-prone conditions on the freeway.

Wide angle mirrors, the mirror setup arrangements are made in the short bends and corners for viewing the approaching vehicle on the other side. However, it has several drawbacks. The mirror may get damage because of animals (in hills) or it doesn't reflect the image when the climatic condition occurs like raining or covered with mist, etc., also when the number of vehicles approaching one after other, it wouldn't be visible for the following vehicle to see the opposing vehicle in concerns and there are numerous methods available for the tiredness prevention of the drivers and detection techniques using alcohol impact, accelerator, brake, clutch, etc., [3]. But there are no proper solutions for making other road users to take a safe turn in corners.

The objective of our project is to monitor and control the traffic near U-turns to avoid accidents. Using this system will be able to monitor and control the traffic near the turns. When a vehicle take turn from one side to the other side the signal will be sent and red light is turned on along with the laser. If any other vehicles violate the rules a message will be sent to concerned person and also buzzer will be turned on to indicate. Once the vehicle is done taking turn signal will be reset from red to green.

The need to study The proposed system makes use of an Arduino board which acquires data from multiple sensors and processes it in real time environment. The proposed method is simple, easy to implement as well as cost-effective.

III. PROPOSED SYSTEM

This System has been designed to prevent an accident by collision in U-turns. The 'heart' of the unit is Arduino microcontroller which performs all the vital tasks of the system and it will be discussed in the following sections. The system will receive signals from infrared sensor, laser and LDR sensor and accordingly transmit the data to the controller. The vehicle drivers are alerted on approaching vehicles through the buzzer sound indication and traffic light, the vehicle information will be shown to the vehicle user [4]. The main purpose of the system is to prevent the collision between two or more vehicle when they take a turn on U-bends. The modules of the system are described in the subsequent sections.

I. METHODOLOGY

The functions of the various components used in this system are explained below.

Arduino microcontroller is usedfor its best feature such as high processing speed, easy to use analog-to-didgital conversion, and low power requirement and capable of performing multitask at a time. It requiremnt and capable of performing multitask at a time. It operates on 5V DC Power supply. It performs all control operations like fetching input signals, processing it and providing output to other systems like LED and buzzer. The microcontroller program is programmed in embeded C using Arduino IDE. It is interfaced with GSM module through serial communication.

The infrared sensor pair is connected to a controller and it transmits the signal directly to the controller on detecting the vehicle approaching towards the hairpin bend earlier at a distance of a few meters. When the vehicle is detected, the controller performs the necessary operations to avoid the accidents. i.e., by signalling the vehicles approaching on the

other side of the road and sounding the buzzer if any vehicles tries for signal jump.

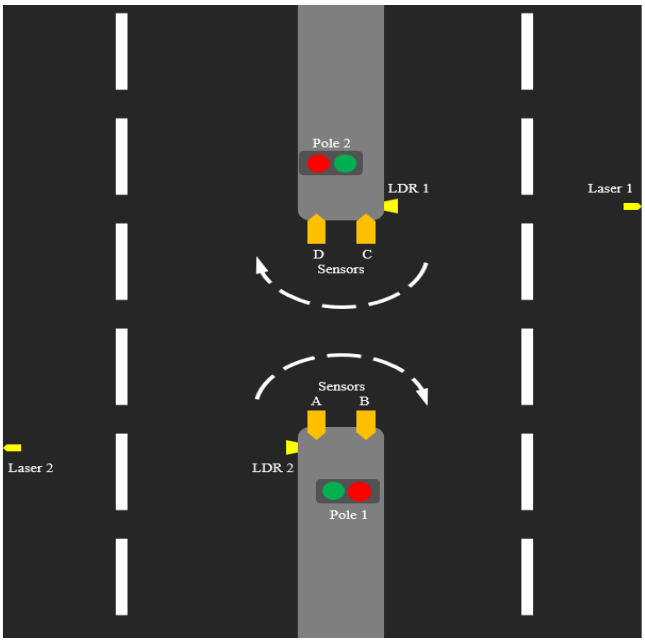

Fig -1: System Model

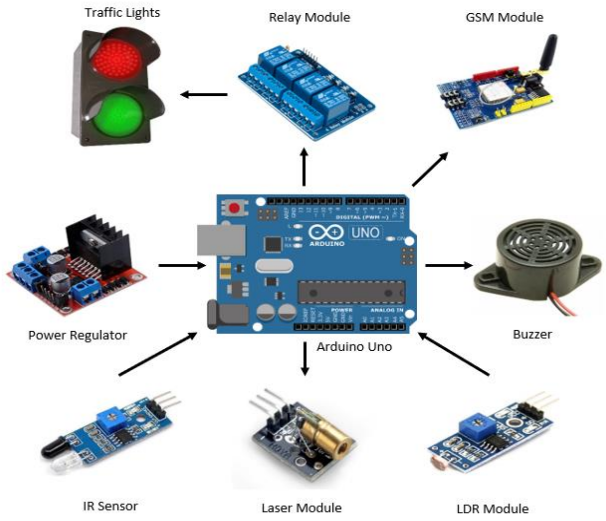

Fig -2 : Working of components

The result is shown in figure 3, 4 and 5. Figure 3 demonstrate how system is implemented. Figure 4 demonstrate how laser detection is working. Figure 5 shows how the system works. Our system avoids accident rate and control traffic in heavliy populated areas. We can also get SMS alert during the worst situations. This system can be implemented by less components which is cost effective.

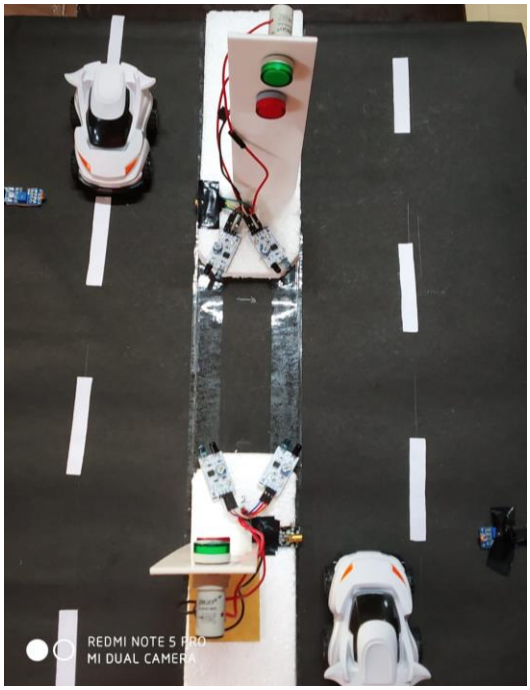

Fig -3: System Implementation

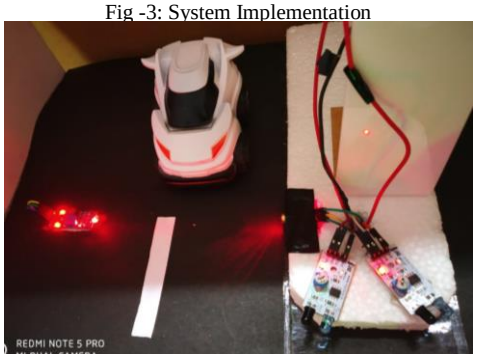

Fig -4: Laser detection

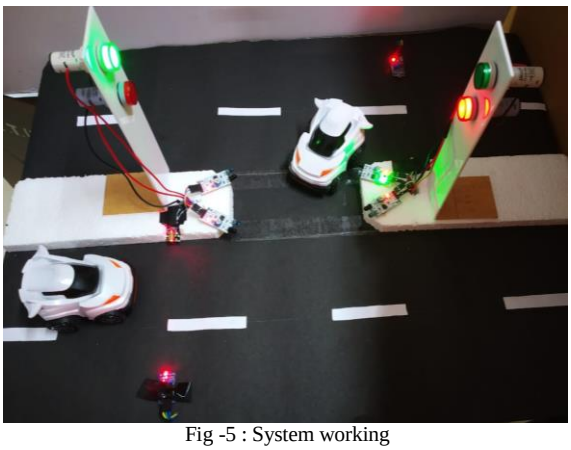

Fig -5 : System working

II. CONCLUSION

This project describes the avoidance of accident due to the negligence of the driver and will be the perfect substitute to the existing mirror setup arrangement. The replacement of mirror setup by the ultrasonic sensor provides a better output as it is given to the microcontroller for further process. The

programming code written in the controller is Arduino basic language. Through the Wi-Fi router, the signal is transmitted to the driver's android phone as a voice recognition message about the traffic and vehicle arrival on the other bend followed by LED indication and the buzzer on the hairpin bends. This project also helps us to monitor the traffic from the control room without any GPS and GSM facility. Thus, we have successfully designed a prototype model which is fully secured from an accident, hence providing safe driving for the vehicle users.

III. FUTURE ENHANCEMENT

Furthermore, this project can be extended by placing RFID tag on all vehicles and can place RFID reader in every hairpin ends especially in hilly areas. So that tracking of an individual vehicle can be made easier. With the help of GPS and GSM module, the navigation facility, as well as traffic information for the driver, can be provided effectively through the voice recognition. In order to increase the accuracy instead of IR sensor, Radar sensor can be used and to increase the processing speed ARM processor replacing Arduino microcontroller. In order to perform multitask FPGA can be introduced with this system along with microcontroller.

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